WE CLAIM:

1. A cooled shroud assembly for a turbine engine comprising:

a recirculation cavity capable of recirculating a flow therein, said recirculation cavity positioned radially outward from a hot gas flow path through said turbine engine;

at least one dilution jet opening in flow communication with said recirculation cavity; and

an angled slot positioned radially inward from said recirculation cavity, said angled slot in flow communication with said recirculation cavity and said hot gas flow path.

2. The cooled shroud assembly of claim 1, wherein said recirculation cavity comprises a hot ingestion gas zone cavity.

3. The cooled shroud assembly of claim 1, wherein said recirculation cavity comprises a hot ingestion gas zone cavity and a cool upper zone cavity in flow communication with said hot ingestion gas zone cavity.

4. The cooled shroud assembly of claim 3, wherein said recirculation cavity further comprises at least one warm middle zone cavity positioned between and in flow communication with said hot ingestion gas zone cavity and said cool upper zone cavity.

5. The cooled shroud assembly of claim 1, wherein said angled slot has a slot angle of less than about 60°.

6. The cooled shroud assembly of claim 1, wherein said angled slot has a slot angle between about 20° and about 60°.

7. The cooled shroud assembly of claim 1, wherein said at least one dilution jet opening is positioned circumferentially in line with an airfoil trailing edge wake of said turbine engine.

8. The cooled shroud assembly of claim 1, wherein said at least one dilution jet opening has a diameter between about 0.015 and about 0.050 inches.

9. The cooled shroud assembly of claim 1, wherein said recirculation cavity is a shroud forward cavity.

10. The cooled shroud assembly of claim 1, further comprising a surface modification positioned in line with said dilution jet opening such that said surface modification is capable of dividing a dilution jet cooling flow from said dilution jet opening.

11. An apparatus for a turbine engine comprising:

a hot ingestion gas zone cavity positioned radially outward from a hot gas flow path through said turbine engine;

at least one warm middle zone cavity positioned radially outward from and in flow communication with said hot ingestion gas zone cavity;

a cool upper zone cavity positioned radially outward from and in flow communication with said at least one warm middle zone cavity;

an angled slot positioned radially inward from said hot ingestion gas zone cavity, said angled slot in flow communication with said hot ingestion gas zone cavity and said hot gas flow path; and

a plurality of dilution jet openings positioned radially outward from said angled slot and in flow communication with said at least one warm middle zone cavity.

12. The apparatus of claim 11, wherein said turbine engine has a plurality of airfoils, and wherein said plurality of dilution jet openings are positioned such that at least one said dilution jet opening is positioned circumferentially in line with each airfoil trailing edge wake.

13. The apparatus of claim 11, wherein said hot ingestion gas zone cavity, said at least one warm middle zone cavity, and said cool upper zone cavity define a shroud forward cavity.

14. The apparatus of claim 13, further comprising a plurality of surface modifications positioned in contact with said shroud forward cavity, such that said surface modifications are capable of inducing flow recirculation within said shroud forward cavity.

15. The apparatus of claim 14, wherein said plurality of surface modifications are fillets having a radius between about 0.02 inches and about 0.5 inches.

16. The apparatus of claim 11, wherein said hot ingestion gas zone cavity, said at least one warm middle zone cavity, and cool upper zone cavity define a shroud aft cavity.

17. The apparatus of claim 11, wherein said turbine engine has a plurality of shroud segment leading edges, further comprising a thermal barrier coating (TBC) in contact with said plurality of shroud segment leading edges.

18. An assembly for a turbine engine comprising:

a recirculation cavity having a hot ingestion gas zone cavity, a warm middle zone cavity, and a cool upper zone cavity, said recirculation cavity positioned radially outward from a hot gas flow path through said turbine engine;

a plurality of dilution jet openings positioned aft of and in flow communication with said recirculation cavity; and

an angled slot in flow communication with said recirculation cavity and said hot gas flow path, said angled slot positioned radially inward from said recirculation cavity.

19. The assembly of claim 18, wherein said angled slot has a slot angle of less than about 60°.

20. The assembly of claim 18, wherein said turbine engine has a hot gas flow there through, and wherein said plurality of dilution jet openings are positioned such that a dilution jet cooling flow there through is capable of inducing flow recirculation of a portion of said hot gas flow.

21. The assembly of claim 18, wherein a distance between a flow exit end of one said dilution jet opening and said recirculation cavity is at least about 0.2 inches.

22. A turbine shroud assembly for a turbine engine having a plurality of airfoils comprising:

a hot ingestion gas zone cavity positioned radially outward from a hot gas flow path through said turbine engine;

a warm middle zone cavity positioned radially outward from and in flow communication with said hot ingestion gas zone cavity;

a cool upper zone cavity positioned radially outward from and in flow communication with said warm middle zone cavity;

an angled slot positioned radially inward from said hot ingestion gas zone cavity, said angled slot in flow communication with said hot ingestion gas zone cavity and said hot gas flow path, said angled slot having a slot angle between about 20° and about 60°; and

a plurality of dilution jet openings positioned radially outward from said angled slot and in flow communication with said warm middle zone cavity, at least one said dilution jet opening positioned circumferentially in line with a trailing edge wake of each said airfoil, and wherein a distance between a flow exit end of each said dilution jet opening and said hot ingestion gas zone cavity is at least about 0.2 inches.

23. A method of shielding a turbine engine from a hot gas flow path there through comprising the steps of:

providing a hot ingestion gas zone cavity radially outward from said hot gas flow path;

positioning at least one dilution jet opening in flow communication with a shroud cooling cavity of said turbine engine and said hot ingestion gas zone cavity, such that flow recirculation is induced within said hot ingestion gas zone cavity during operation of said turbine engine; and

positioning an angled slot between and in flow communication with said hot ingestion gas zone cavity and said hot gas flow path.

24. The method of claim 23, further comprising a step of positioning a cool upper zone cavity radially outward from and in flow communication with said hot ingestion gas zone.

25. The method of claim 24, wherein said turbine engine has a high pressure seal in flow communication with said cool upper zone cavity, and wherein said cool upper zone cavity is capable of recirculating a seal leakage cooling flow from said high pressure seal.

26. The method of claim 24, further comprising a step of positioning at least one warm middle zone cavity between and in flow communication with said hot ingestion gas zone and said cool upper zone cavity.

27. The method of claim 23, wherein said at least one dilution jet opening is positioned circumferentially in line with an airfoil trailing edge wake of said turbine engine.

28. The method of claim 23, wherein said at least one dilution jet opening has a diameter between about 0.015 and about 0.050 inches.